## REMARKS

Claims 1-20 are pending and at issue. The examiner has reiterated his previous rejection of all of the claims as either anticipated by McDonald '239 (US 2002/0172239) or obvious in view of McDonald '239 alone or in combination with Green et al. '345 (US 2002/0126345). The applicant has amended claim 1 above and cancelled claim 2 depending therefrom. The applicant has also amended independent claims 13 and 18. In view of the differences between the claimed subject matter and the cited references, applicant respectfully traverses the rejection and requests reconsideration.

## PRIOR ART REJECTIONS

### 1. Claim 1 and Dependent Claims 3 - 12

Claim 1 has been amended above to recite:

> For use with a laser source providing light along a reference axis, an optical filter comprising:
>
> a first filter element having a first angular sensitivity to the reference axis to tune a wavelength of the light in response to changes in an angle of incidence of the light upon the first filter element; and
>
> a second filter element having a second angular sensitivity to the reference axis to tune the wavelength in response to changes in an angle of incidence of the light upon the second filter element, wherein the second angular sensitivity substantially cancels the first angular sensitivity, wherein simultaneous rotation of the first and second filter element relative to the reference axis does not tune the wavelength.

Etalons are used for a two-fold purpose: 1) to establish a narrow bandwidth (transmission peak) on the output wavelength of a light source – due to the etalon's thin mode profile and high reflectivity; and 2) to tune that output wavelength to the desired value by tuning the etalon's transmission peaks within the joint free spectral range. The etalons described in McDonald '239 document are designed to achieve both of these functions.

The present application provides etalon configurations that are specifically designed to maintain the narrow bandwidth effect of etalon filters (1 above), but where the angular wavelength dependence (2 above) has been substantially removed. Whether through two etalons each having opposing angular sensitivities, or through two passes through a single etalon, where each path has a different angular sensitivity, with the techniques of the present application, the wavelength of the optical system may be made independent from the angular position of the etalon filters for that system.

Along these lines, claim 1 has amended to recite subject matter similar to claim 2, specifically, that the angular sensitivity on the second filter element substantially cancels that of the first filter element. Claim 1 now recites an optical filter comprising "a second filter element having a second angular sensitivity to the reference axis to tune the wavelength in response to changes in an angle of incidence of the light upon the second filter element, wherein the second angular sensitivity substantially cancels the first angular sensitivity, wherein simultaneous rotation of the first and second filter element relative to the reference axis does not tune the wavelength"

Contrary to the office action's read, McDonald '239 does not teach the recited subject matter. McDonald '239 does teach a two-filter wavelength reference device, which as stated throughout forms a wavelength reference device expressly for the purpose of tuning the output wavelength. McDonald '239 discloses two types of tuning with its two etalons. Continuous tuning, that is of both etalons simultaneously, moves the $FSR_1$ and $FSR_2$ overlap peak, $P_j$, through a joint free spectral range of the system. Differential tuning changes the peaks of each etalons FSR, $FSR_1$ or $FSR_2$, to change the spectral location of the peak overlap and can be used to tune over larger frequency ranges than the free spectral range. In either case, it is clear , the etalons retain their angular dependence to effect wavelength tuning.

> Tuning of etalons 24, 26 can involve adjustment of the distance between faces 28, 30 and 32, 34 and/or adjustment of the refractive index of the etalon material,

> and may be carried out using various techniques, including thermo-optic, electro-optic, acousto-optic and piezo-optic tuning to vary refractive index, **as well as mechanical angle tuning** and/or thermal tuning to vary the spacing of etalon faces. More than one such tuning effect may be applied simultaneously to one or both etalons 24, 26, depending upon the particular embodiment of the invention.

McDonald '239 [0042]. The mechanical angle tuning is described in [0087] cited by the examiner.

> **Angle tuning involves rotating or tilting etalons with respect to the light beam traveling therethrough, to increase or decrease the phase difference between successive reflections in the etalons, and hence increase or decrease the free** spectral range. Referring to FIG. 7, there is graphically shown the effect of tilt (milliradians) versus frequency change (Hertz) for a 50 GHz thick silicon etalon, with the wavelength at zero tilt at approximately 1550 nanometers. Angle tuning of etalons can be achieved using a variety of conventional precision micropositioning or translation devices to provide for precise angular positioning of etalons for wavelength tuning.

McDonald '239 [0087].

> Continuous tuning of the dual etalons of FIG. 1, by providing substantially the same rate of angular tuning to each of two etalons simultaneously, allows **tuning of the etalons' joint transmission peak within the joint free spectral range defined by the etalons**. Differential angle tuning provides a shift in the Vernier beat for **tuning over a range greater than the joint free spectral range**. The high refractive index of silicon provides a good margin for angle tuning of etalons, and **angle tuning of dual silicon etalons provides effective wavelength tuning over a wide wavelength range**.

McDonald '239 [0088].

Each of these passages clearly describes that angular rotation of the etalon pairs results in angular tuning, which means that etalon rotation directly alters the output wavelength. This relationship is shown by example in Figure 7, which shows a non-linear increase in frequency as the tilt angle is changed for silicon etalons.

None of the passages from McDonald '239 describe the recited subject matter, but instead McDonald '239 would appear to teach just the opposite from the now-claimed optical system comprising a second filter element having a "second angular sensitivity [that] substantially cancels the first angular sensitivity [of a first filter element], wherein simultaneous rotation of the first and second filter element relative to the reference axis does not tune the wavelength."

The example of continuous tuning, i.e., tuning both etalons through the same angle, is perhaps most telling of the differences between McDonald '239 and the present application. While McDonald '239 uses this same-rate tuning on both etalons to tune the joint transmission peak, $P_j$, of its two etalons, Figure 5 of the present application shows an apparatus where such joint movement of two etalons having <u>opposing angular sensitivity</u> (i.e., through movement of the support 506) does not tune the output wavelength of the system, but rather leaves it substantially unaltered. Wavelength tuning is instead affected by other techniques such as through relatively thermo-optic tuning between filters using the element of Figure 6.

Differential tuning in McDonald '239 further highlights the differences from the present application. This type of tuning relies on a relative difference in the tuning of each element, which difference adjusts the $FSR_j$ of each etalon and thus adjusts the overlap peak, or filtered wavelength. If the angular wavelength dependence of each etalon canceled out that of the other, then when one adjusted the incident angle for the etalons, not tuning would occur, no adjustment in the $FSR_j$ or the overlap peak Pj would occur – a condition which is clearly not described or contemplated by McDonald '239, either expressly or inherently.[1]

---

[1] In response to applicant's previous remarks, the examiner argues that because the etalons of McDonald '239 are tuned through different relative angles they must inherently cancel, equal or offset each other. First, the examiner points to nothing in the publication as stating that differential tuning involves all three of these options. As noted above, the publication only discusses differential tuning in relation to wavelength **<u>tuning</u>** by Vernier-effect adjustment of the relative $FSR_j$. Not only is there no suggestion of canceling the angular dependence of the etalons, the publication appears to expressly require such dependence to effect operation. Second, the examiner's use of the conjunctive form "or" demonstrates that the inherency rejection is legally impermissible. Possibility, which is what "or" means in the examiner's usage, is not a legally permissible ground for inherency. For a teaching to be argued as inherent, that teaching must <u>necessarily</u> be present in the single prior art disclosure. See, e.g., *Electro Medical Systems, S.A. v. Cooper Life Sciences, Inc.*, 34 F.3d 1048 (Fed. Cir. 1994). Courts do not allow inherency challenges based on mere possibility or conjecture. "The mere fact that

For these reasons, the rejections of claim 1 and the claims depending therefrom are respectfully traversed.

**2. Claim 13 and Dependent Claims 14 - 17**

Independent claim 13 recites a laser device comprising a gain medium and a laser cavity for receiving a light at a wavelength from the gain medium. As amended, the laser device further comprises a filter apparatus disposed to receive the light at an angle of incidence, the filter apparatus and the laser cavity defining a reference axis, the filter apparatus having a first angular sensitivity to the reference axis and a second angular sensitivity to the reference axis that substantially cancels the first angular sensitivity wherein the wavelength of the light is substantially independent of the angle of incidence.

For the reasons outlined above, the rejection of independent 13 is also traversed. None of the prior teach teaches or suggests the recited subject matter or the subject matter of the claims depending therefrom.

**3. Claim 18 and Dependent Claims 19 and 20**

The remaining independent claim, claim 18, recites a transponder comprising a filter apparatus similar to that recited in claim 13 discussed above. Specifically, the transponder is now recited as comprising a laser source for producing a laser energy at a wavelength, the laser source having a filter apparatus disposed to receive the laser energy, "where the filter apparatus has a first angular sensitivity to a reference axis of the laser source and a second angular sensitivity to the reference axis that substantially cancels the first angular sensitivity, the wavelength of the laser energy being substantially independent of the angular position of the filter apparatus." As such, the rejection of claim 18 is traversed for the reasons outlined above. Claim 18 and the claims depending therefrom are in condition for allowance.

---

a certain thing may result from a given set of circumstances is insufficient to prove anticipation." *Electro Medical Systems, S.A., v. Cooper Life Sciences, Inc.*, 34 F.3d 1048, 1052 (Fed. Cir. 1994). Here the only relationship described between the angular differential tuning is one in which the angular dependencies of each etalon are not cancelled with one another.

In view of the above amendment, applicant believes the pending application is in condition for allowance.

Dated: June 16, 2006

Respectfully submitted,

By [signature]

Paul B. Stephens
Registration No.: 47,970
MARSHALL, GERSTEIN & BORUN LLP
233 S. Wacker Drive, Suite 6300
Sears Tower
Chicago, Illinois 60606-6357
(312) 474-6300
Attorney for Applicant